

Date: Wednesday, 4/4/2007 9:00:16 AM
 User: Kim Johnston

Process Sheet

Customer	CU-DAR001 Dart Helicopters Services			Drawing Name	X-TUBE 412		
Job Number	31601			Part Number	D412664145		
Estimate Number	12783			Drawing Number	D412-664-245 U/R		
P.O. Number	N/A			Project Number	N/A		
This Issue	4/4/2007	S.O. No.	N/A	Drawing Revision	U/R		
Prsht Rev.	NC	Type	LANDING GEAR	Material	N/A		
First Issue	N/A			Due Date	4/30/2007		
Previous Run	31596			Qty:	1	Um:	Each
Written By	JLM 07/04/04						
Checked & Approved By							
Comment	Est Rev: A New Issue 07-02-14 JLM						

Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description:
1.0	DC	DOCUMENT CONTROL  Comment: Photocopy bluefile & type labels per PPPD412-664-105 CHG 001 <i>N/A PACKAGED with B31601</i>
2.0	D6019128	Crosstube Material  Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s) Pick: Qty Part number Description Batch 1 D6019-128 Crosstube <i>B29369</i> Check OD = 2.7500"; ID = <i>8607/04/12</i>
3.0	MORI SEIKI	MORI SEIKI CNC LATHE LARGE  Comment: MORI SEIKI CNC LATHE LARGE Turn as per Dwg D412-664-145 <i>85 07/04/12</i>
4.0	QC2	INSPECT PARTS AS THEY COME OFF MACHINE  Comment: INSPECT PARTS AS THEY COME OFF MACHINE <i>88 07/04/18</i>
5.0	QC8	SECOND CHECK  Comment: SECOND CHECK <i>9ml 07/04/19</i>
6.0	LANDING GEAR 1	LANDING GEAR RESOURCE 1  Comment: LANDING GEAR RESOURCE 1 1-Polish entire outside surface of crosstube <i>JD 7-4-20</i>

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____
 QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Wednesday, 4/4/2007 9:00:16 AM
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Drawing Name: X-TUBE 412

Job Number: 31601

Part Number: D412664145

Job Number:



Seq. #: Machine Or Operation:

Description:

7.0 QC5

INSPECT WORK TO CURRENT STEP



JB 7-4-20

Comment: INSPECT WORK TO CURRENT STEP

8.0 HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

JB 7-4-20

9.0 QC3/5

INSPECT WORK/WING WALK



7-5-3

Comment: Inspect work & Chemical conversion Coat

10.0 BENDING

BENDING MACHINE



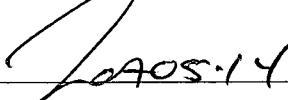
Comment: BENDING MACHINE

Bend tube as per Dwg D412-664-145 using CNC bender program

EL 7-5-3

11.0 QC6

DIMENSIONAL CHECK



Comment: DIMENSIONAL CHECK

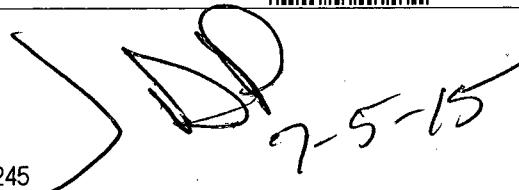
12.0 LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Drill pilot holes in tube as per Dwg D412-664-245



2-Ream hole to finish size in tube as per Dwg D412-664-245

3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-245

JD 7-5-15

13.0 HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat Tube as per QSI 005 4.1

JD 7-5-15

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Process Sheet

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Drawing Name: X-TUBE 412

Job Number: 31601

Part Number: D412664145

Job Number:



Seq. #: Machine Or Operation:

Description :

14.0 QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION

704-15 (1)



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

15.0 QC5

INSPECT WORK TO CURRENT STEP

704-15 (1)



Comment: INSPECT WORK TO CURRENT STEP

16.0 OUTSIDE SERV.10

OUTSIDE SERVICES -LG



Comment: Sub-Contracting OUTSIDE SERVICES

Liquid Penetrant Inspection as per QSI 0380r

Issue P/O: 3781 LPI as per ASTM 1417

Level 2 Attach copy of NDT results to work order

705/15 (1)

17.0 PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Inspect for transit damage

Ensure copy of NDT results attached to work order

705/16 (1)

18.0 QC5

INSPECT WORK TO CURRENT STEP

705-16 (1)



Comment: Inspect for damage & ensure results are as per Dwg D412-664-203

19.0 SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside and outside crosstube as per QSI 005 4.2

85
07-05-23

2-Paint outside crosstube with White Imron as per QSI 005 4.2

20.0 QC14

INSPECT SPRAY PAINT

705-24



Comment: Inspect Spray Paint

Wrap in plastic bag to protect from scratches

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
07.06.22	25	REPLACE MS21920-22 CLAMPS WITH MS21920-24 CLAMPS. Ref: Rev. D412-664-14S Rev.C				QP 07.06.22 DVR 081442	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____
 QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Wednesday, 4/4/2007 9:00:16 AM
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Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE 412

Job Number: 31601

Part Number: D412664145

Job Number:



Seq. #: Machine Or Operation:

Description:

21.0 D31893 Chafing Shield



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Chafing Shield

Batch: 31959

BT 07-06-20

22.0 D3595 Rubber Cushion (per sq ft)



Comment: Qty.: 0.0798 sf(s)/Unit Total : 0.0798 sf(s)

Rubber Cushion

Cut to .630" X 4.4" X 4 PCS

Batch: 632894

BT 07-06-20

23.0 D28931 Support



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part number Description Batch

2 D2893-1 Support

29524

BT 07-06-20

24.0 D2856600 Abrasion Strip



Comment: Qty.: 0.9450 f(s)/Unit Total : 0.9450 f(s)

Abrasion Strip

1X D2856 .250" X 8.42"

Batch: 26690

BT 07-06-20

25.0 MS2192022 Clamp(per MIL-DTL-8783C)

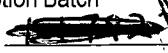


Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part number Description Batch

2 MS21920-22 Clamp



26.0 MS2192024 Clamp(per MIL-DTL-8783C)



Comment: Qty.: 6.0000 Each(s)/Unit Total : 6.0000 Each(s)

clamp(per MIL-DTL-8783C)

batch: M103002

BT 07-06-20

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: Date: 07/06/20
 QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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NOTE: Date & initial all entries

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User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services		Drawing Name: X-TUBE 412
Job Number: 31601		Part Number: D412664145
Job Number: 		
Seq. #:	Machine Or Operation:	Description:
27.0	LANDING GEAR 1 	LANDING GEAR RESOURCE 1 
<p>Comment: LANDING GEAR RESOURCE 1 Assemble as per Dwg D412-664-145</p> <p>Install Chaffing Shield</p> <p>Instal supports with magnobond 6398 per dwg D412-664-245, cure for 12hrs before packaging.</p> <p>Time & date of application: <u>3:15 07-06-19</u> Batch: <u>103628</u></p> <p><i>AT 07-06-20</i></p>		
28.0	QC5 	INSPECT WORK TO CURRENT STEP  <i>07-06-22</i>
<p>Comment: INSPECT WORK TO CURRENT STEP</p>		
29.0	PACKAGING 1 	PACKAGING RESOURCE #1 
<p>Comment: PACKAGING RESOURCE #1 Identify and pack for shipping as per PPP D412-664-105</p> <p>*****Ensure tube is not packaged if curing time is less than 12 hrs, see step 26 for application time & date *****</p> <p>Time & date of packaging: <u>12.45</u></p> <p>Location: <u>PM 321881</u> <i>10/2/22</i></p> <p>PPP Rev: <u>10/2/22</u></p> <p>POSITIVE RECALL EFFECTIVE <u>07.04.04</u> AUTH <i>IP</i> RELEASED <u>07.06.22</u> DATE <i>IP</i></p>		
30.0	QC21 	FINAL INSPECTION/W/O RELEASE  <i>10/2/22</i>
<p>Comment: FINAL INSPECTION/W/O RELEASE</p>		
Job Completion 		<i>10/2/22</i>

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____
 QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order: 31601
Description: X Tube 472	Part Number: D412664145
Inspection Dwg: D412664145 Rev: B	Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

First Article Prototype

Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
2.740	+ .005 - .000	2.750	—			
2.490	"	2.494	✓			
2.557	"	2.560	—			
2.624	"	2.628	—			
2.692	"	2.696	—			
2.750 (stack)		2.750	—			
2.740	+ .005 - .005	2.741	✓			
2.490	"	2.491	✓			
2.557	"	2.558	✓			
2.624	"	2.625	✓			
2.692	"	2.693	—			
2.750 stack.		2.750	✓			
124.476		124.476	✓			

Measured by:	J. B.	Audited by:	amk	Prototype Approval:	
Date:	07/04/18	Date:	07/04/19	Date:	

Rev	Date	Change	Revised by	Approved
A		New Issue	KJ/JLM	

DART AEROSPACE LTD

Work Order: 31601

Description: Crosstube Low Narrow Fwd (412)

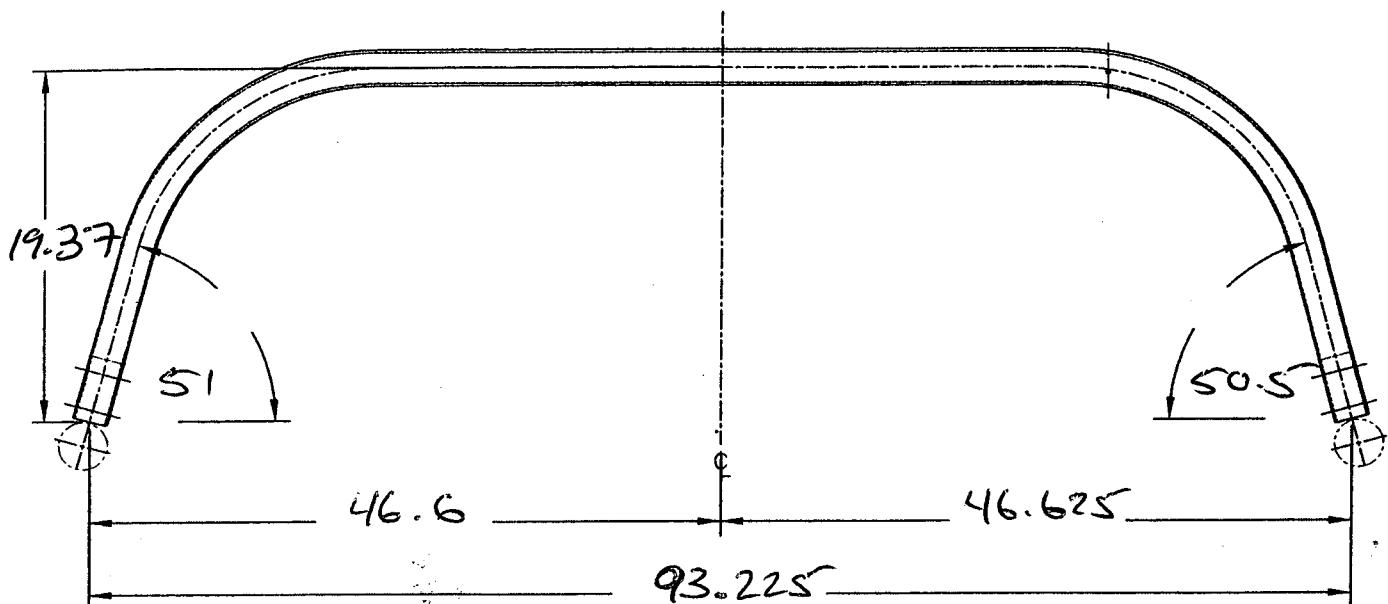
Part Number: D412-664-105

Inspection Dwg: D412-664-145

Rev: C

Page 1 of 1

Required Dimension	Min	Max
Height	19.23	19.49
1/2 Span	46.47	46.73
Angle	49°	52°
Total Span	92.94	93.46



Comments

QC15 Inspection	<i>[Signature]</i>
Date	0705-14

Rev	Date	Change	Revised by	Approved
A	07.04.27	New Issue	KJ/JM	



HeathAir
INTERNATIONAL (1991) INC.

881 Ave. Lepine, Dorval, Québec H9P 1G8
Tel.: (514) 636-1000 • Fax: (514) 636-0031

W.O. № 36413

A.M.O. Number: 46/90

NON-DESTRUCTIVE TESTING REPORT

AIRCRAFT / COMPONENT INFORMATION

REGISTRATION:

MODEL/TYPE:

SERIAL NUMBER:

TOTAL W/H/LDG:

OPERATED BY:

BASED AT:

INSPECTION REQUIREMENTS

Carry out FPI of (4) cross tubes (external surface) as per ASTM E-1417-05 and the Dart QSI 038, Section 4.1.1 (on file at client) - parts delivered to HeathAir.

Qty (1) P/N D407-667-205 S/N B31039
 Qty (1) P/N D412-664-145 S/N B31601
 Qty (2) P/N D412-664-245 S/N B31599 and B31597.

RADIOGRAPHY

ULTRASONIC

PENETRANT

MAGNETIC PARTICLE

EDDY CURRENT

INSPECTION REPORT

Fluorescent penetrant inspection was performed in accordance with the above requirements on (4) Cross Tubes.

Note: A Level 3 penetrant was substituted for the requested Level 2 (3 is more sensitive)
 Ardrox 970P25E Batch #04B503.

(4) cross tubes inspected. (4) PASSED inspection / (0) FAILED inspection.

THE MAINTENANCE DESCRIBED ABOVE HAS BEEN PERFORMED IN ACCORDANCE WITH
 THE APPLICABLE STANDARDS OF WORTHINESS

INSPECTED BY: 

DATE

May 15, 2007

INSPECTION
STAMP(S)



CUSTOMER: Dart Aerospace

CUSTOMER INFORMATION

P.O. NUMBER

3781

ADDRESS: Fax. 613-632-1053

CONTACT NAME:

Linda

LABOUR	②	\$
MATERIALS	②	
TRAVEL EXPENSES	②	GST
HOTEL EXPENSES	②	PST

INVOICE NO.

TOTAL \$

DART

DESIGN	DRAWN BY	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED	APPROVED	DRAWING NO.	REV. C
DATE		SHEET 1 OF 3	
07.03.29		TITLE CROSSTUBE ASS'Y (412 LOW-N FWD) NTS	
A	06.12.21	SCALE	
B	07.03.01	CHG RUBBER CUSHION	
C	07.03.29	CHG CLAMP & RUBBER CUSHION LGTH.	

RELEASED07.04.24 *[Signature]***PARTS LIST:**

Qty	Part Number	Description
X	D412-664-145	CROSSTUBE ASSEMBLY (412 LOW-NARROW FWD)
1	D6019-128	CROSSTUBE
1	D2856-250-842	ABRASION STRIP
2	D2893-1	SUPPORT
1	D3189-3	CHAFING SHIELD
4	D3595-063-450	RUBBER CUSHION
2	MS21920-24	CLAMP
4	MS21920-25	CLAMP (OR MS21920-26)
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

GENERAL NOTES:

- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 2) MATERIAL: MANUFACTURED FROM D6019-128
FINISHED LENGTH = 124.48 ± 0.020 (BEFORE BENDING/TRIMMING)
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR D3189-3 CHAFING SHIELD AND ASSOCIATED HARDWARE.
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2856-XXX-YYY ABRASION STRIPS WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-25 CLAMPS (OR -26) WITH D3595-063-450 RUBBER CUSHIONS TO D2893-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN CROSSTUBE AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

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DART

DESIGN	DRAWN BY	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED	APPROVED	DRAWING NO.	REV. B
		D412-664-145	SHEET 1 OF 3
DATE		TITLE	
07.03.01		CROSSTUBE ASS'Y (412 LOW-N FWD) NTS	
A	06.12.21	NEW ISSUE	
B	07.03.01	CHG RUBBER CUSHION	

PRELIMINARY ISSUE

GP

07.04.04

PARTS LIST:

Qty	Part Number	Description
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1	D2856-250-842	ABRASION STRIP
2	D2893-1	SUPPORT
1	D3189-3	CHAFING SHIELD
4	D3595-063-440	RUBBER CUSHION
2	MS21920-22	CLAMP
4	MS21920-24	CLAMP
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

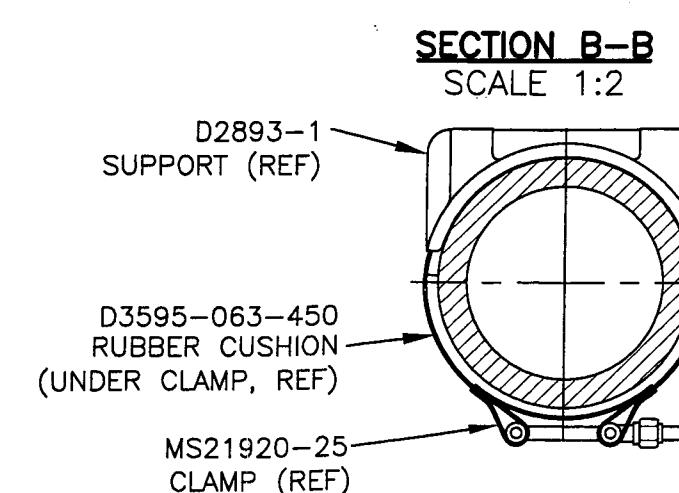
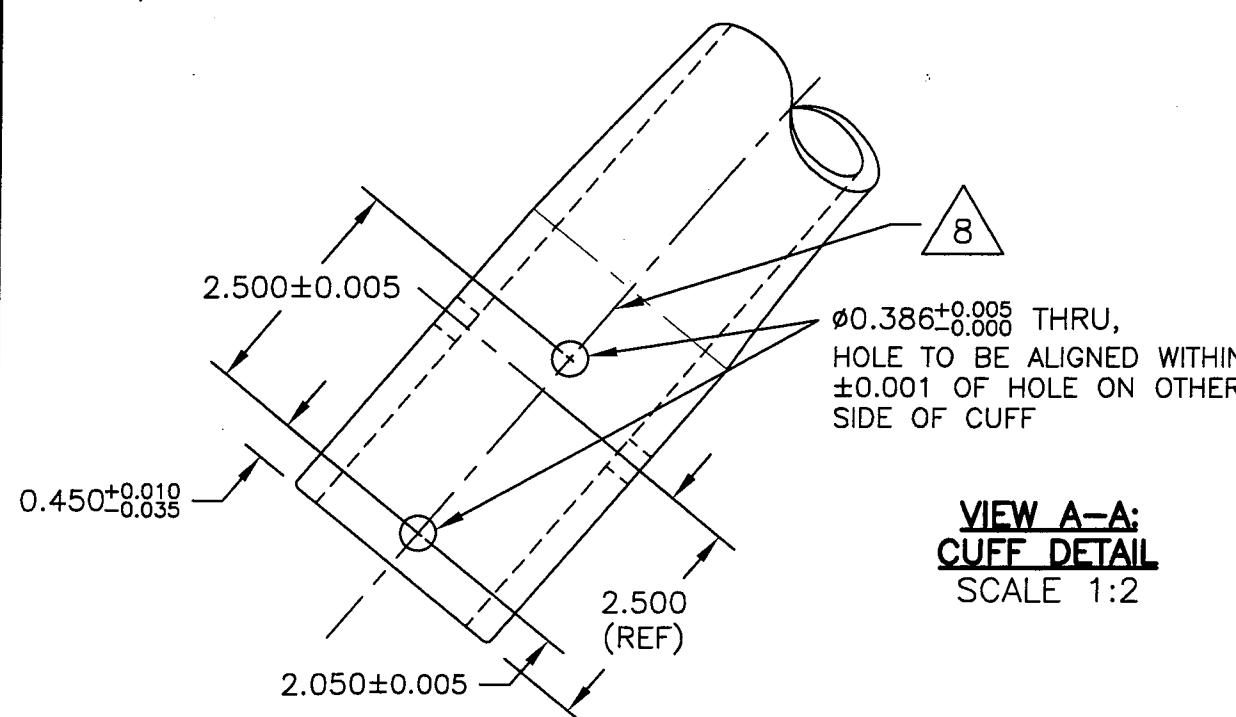
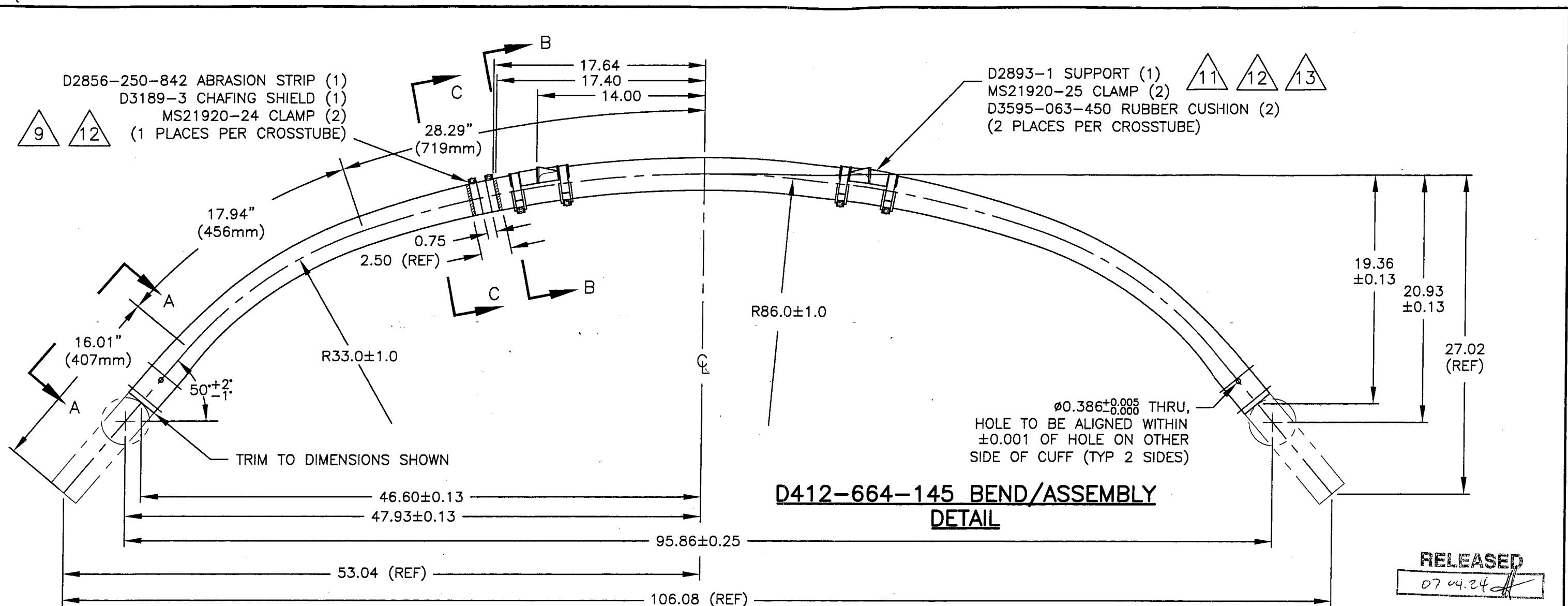
GENERAL NOTES:

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- 2) MATERIAL: MANUFACTURED FROM D6019-128
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- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR MS21920-22 CLAMPS AND ASSOCIATED HARDWARE.
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2856-XXX-YYY ABRASION STRIPS WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
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- 12) INSTALL MS21920-24 CLAMPS WITH D3595-063-440 RUBBER CUSHIONS TO SECURE D2893-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB.

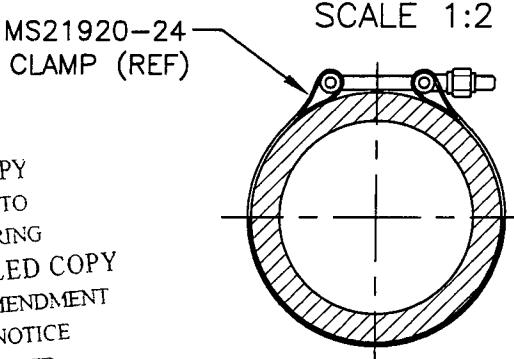
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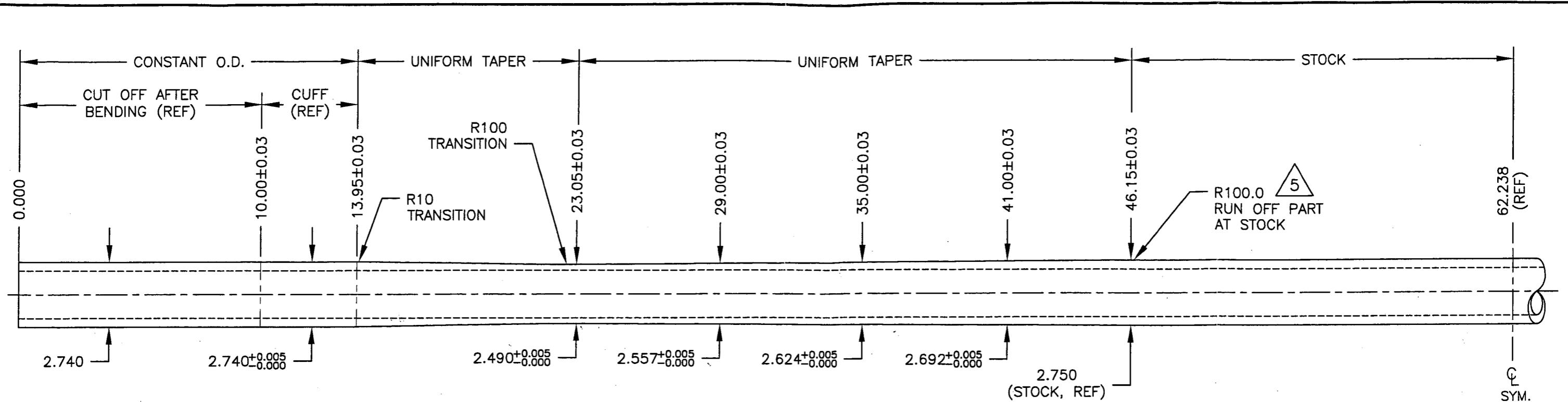


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9P	9P		REV. C
CHECKED	APPROVED		DRAWING NO.
DATE			SHEET 2 OF 3
07.03.29			TITLE CROSSTUBE (412 LOW-NARROW FWD) 1:8



D412-664-145 MACHINING DETAIL

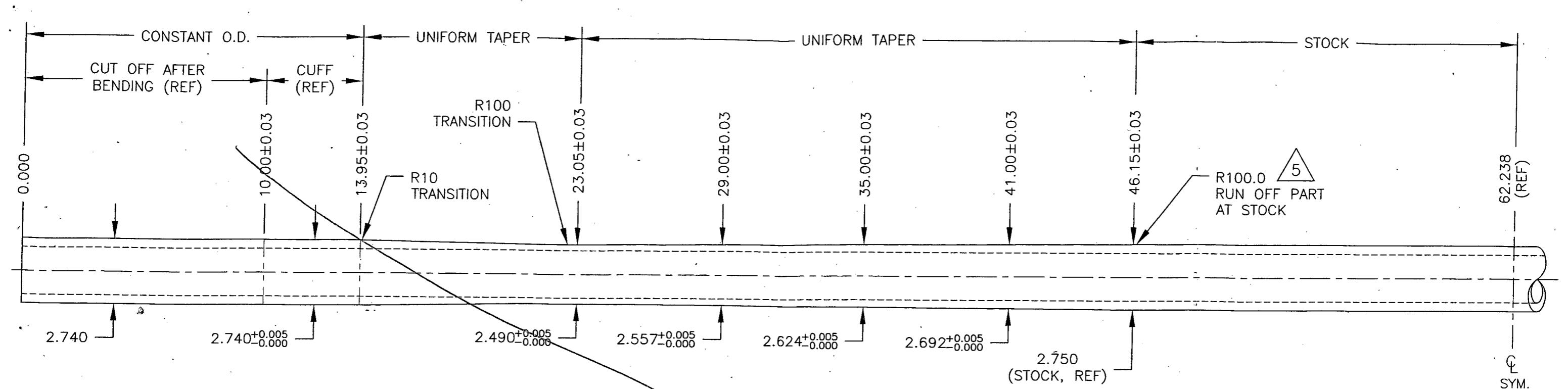
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07.04.19

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				D412-664-145	SHEET 3 OF 3
DATE	07.03.29	SCALE		CROSSTUBE (412 LOW-NARROW FWD)	1:4



D412-664-145 MACHINING DETAIL

PRELIMINARY ISSUE

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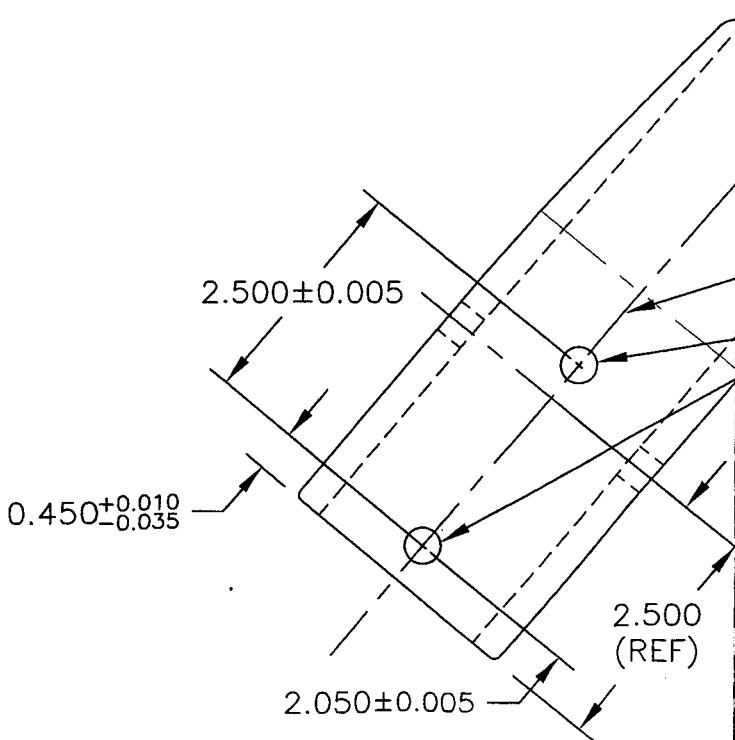
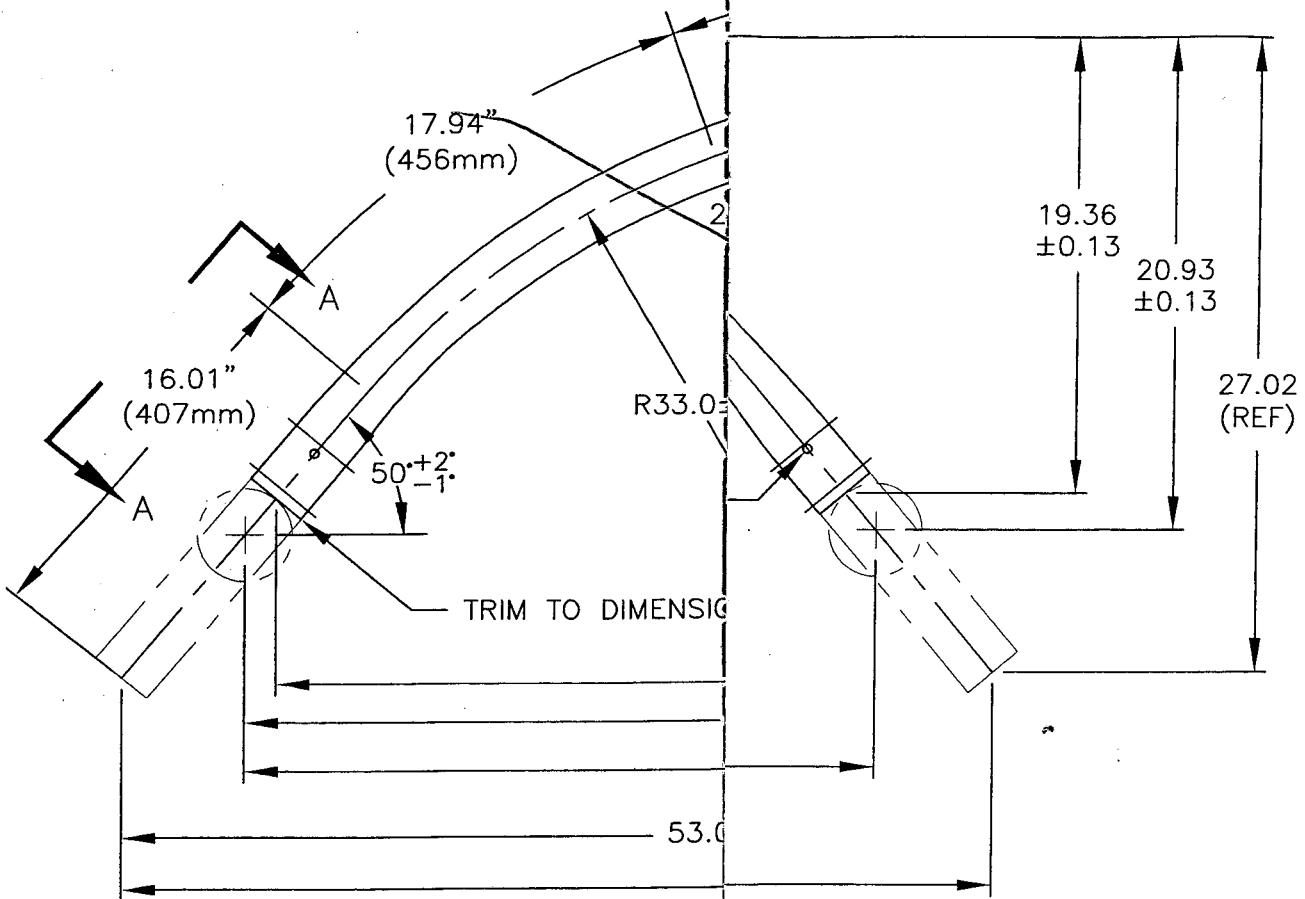
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DATE			REV. B SHEET 3 OF 3 TITLE CROSSTUBE (412 LOW-NARROW FWD) 1:14

D2856-250-842 ABRASION STRIP (1)
 D3189-3 CHAFING SHIELD (1)
 MS21920-22 CLAMP (2)
 (1 PLACES PER CROSSTUBE)

9 12

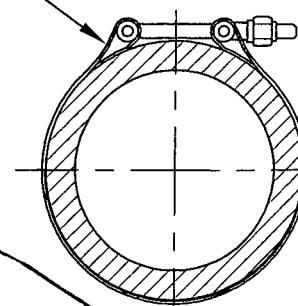
11 12 13
 USHION (2)

PRELIMINARY ISSUE



SECTION C-C
 SCALE 1:2

MS21920-22
 CLAMP (REF)



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		D412-664-145	SHEET 2 OF 3
		TITLE	SCALE
		CROSSTUBE (412 LOW-NARROW FWD)	1:8